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Study on sustainable utilization strategy of the mining wastelands

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Abstract

With the development of mining, our country's land was damaged more and more. The contradiction between man and land in mining areas has become sharp. During the long time, we look down on environmental protection. It makes mining area and their surrounding area have environmental pollution, ecological degradation and a serious threat to the human quality of life. This article through field surveys summarizes theory and technology of the mining wastelands and puts forward some existing questions and solutions.

Keywords: Mining Wastelands; Sustainable Utilization; Strategy

1. Summary of mining wastelands

1.1. Mining wastelands

Wasteland means abandoned land. Broadly speaking, the abandoned land types include abandoned mine land, industrial wasteland, landfill, etc. Mining wastelands means the land cannot be used without management, because the mining activities of destruction and occupation. [1]

1.2. Mining wastelands features and hazards

1.2.1 Mining wastelands features

Mining wastelands can be divided into the following categories. Mining of rock fragments through surface soil stripping to accumulation of low grade ore and waste rock pile of wasteland. Mining

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wastelands are characterized by perennial formation of stagnant water or wetlands that from the collapse. Through elected the various sorting methods for mined ore concentrates of residues accumulation formed tailing. The large numbers of tailings contain toxic elements. Some abandoned land area, such as mining machinery, auxiliary facilities and roads, etc. [2]

1.2.2 Mining wastelands hazards

1.2.2.1 Damage land resources

In normal, open pit mining area equivalent to the mining area of land occupied by more than 5 times. State-run mining enterprises in China more than 8000 and individual mine reaches more than 230,000. These mining enterprises destroy land resources in mining area is amazing. Damaged land about 28,800 km2 in China and growing as a rate of 467 km2 per year. It will be intensify the contradictions between human and land. [3]

1.2.2.2 Environmental contamination

Acid, alkaline or heavy metals through atmospheric dispersion will pollute the water, air, soil and biological environment. Its impact far exceeds the mining area. At present, direct contamination caused by tailings in China have been more than 60,000 hectares; indirectly contaminate the land area more than 600,000 hectares. According to the material statistics, about 3 billion tons mining waste in China. Currently approximately 1.5-2.0 million tons of the waste was produced each year and about 300-400hm2. Waste not only consumes a large amount of land, but also causes environment pollution from spontaneous combustion. Leaching water sometimes presents a strong acid, alkaline or toxic elements. Bad siting and seepage measures will be contaminated surrounding soil, surface and underground waters. This has become one of the main environmental problems in mining area. [4]

1.2.2.3 Ecological balance and the earth's surface be destroyed

Prospecting always disturbs surface and underground of the earth. It could cause great harm to the biosensors community and many hazards are irreversible. Bare mine land continued to intensify this destruction, resulting in disorder of biodiversity and ecological balance in the abandoned land. Tailings, mining area or other areas, vegetation degradation are very serious, even barren. Open-pit mining and underground mining will cause many times damage of district ecological and natural landscape. [5]

2. Present situation of study on the reuse of mining wastelands

2.1. Study of the theory

2.1.1 Land reclamation and ecological restoration

In the 1980s, western countries began to focus on the rehabilitation and reconstruction of degraded ecosystems. Both of theory and practice focus on recovery, development and protection of ecosystem degradation problem. [6] Mine ecosystem restoration is one of the important fields of restoration ecology study. Theoretical research with sustainable development as the guiding ideology of theoretical study based on land reclamation, ecological succession and abandoned landscape construction in mining area. [7]

2.1.2 Landscape update and reuse

Renewal and reuse of industrial wasteland landscape art and landscape transformation began in the 1960s. In the influence of various arts genres, such as land art and ecological art, post-industrial landscape was emerging. By some landscape architect's working, such as Richard Haag, Peter Latz, George Hargreaves. We pay more attentions on art and landscape of Western countries on industrial wasteland improvement research and practice in the late 90s of the 20th century to the early 21th century. Currently, domestic studies of existing foreign-related theoretical background, philosophy theory and techniques,

further more have major artists, landscape architects and their works. There are also some practical results of the review and summary.

2.1.3 Land function replacement and update

Western countries have a theory of city regeneration. United Kingdom has policy and practice on mode of exploration and deepening process; United States take some transformation and renovation policy on brown land reconstruction. In China, Mr. Wu Liangyong proposed organic renewal of urban theory in 1983, leading the development of China's urban renewal theory. [8]

2.2. Technique exploration

2.2.1 Exploration on ecological restoration and reconstruction

2.2.1.1 Matrix improved

In general, mining wasteland lack of nutrients, such as n, p, k, but these natural processes are difficult to recover or need longer time. It must be restored through man-made. Soil as a plant growth medium, its physical and chemical properties and nutrition is the key to the success of ecological restoration and reconstruction.

2.2.1.2 Vegetation recovery

The topsoil and vegetation in mining always be destroyed and ecosystem be damaged. Vegetation restoration plays construction role in a degraded ecosystem. It also can plays a role to promote the recovery between soil structure and fertility; soil microorganism and animal, thus contributing to the rehabilitation and reconstruction of overall ecosystem structure and function. Analysis of plant growth conditions, the most important thing is plant species selection of vegetation restoration and soil conditions. [9]

2.2.2 Study on landscape renewal and reuse

Mining wastelands become the focus in 1970s. Reformation of mining areas is to restore it to its former natural landscape. Technically, normal transformation is the most important technology. United States is mainly in the form of wastelands shape, and the most famous example is gasworks Park in Seattle built in 1972. It is the first one to use the method to reuse the abandoned land of landscape, although it is not direct modification of mining area, but it had a widely impact on landscape design. Landscape transformation of abandoned mines is a revelation in the future. In China, there are the park of mining, industrial landscapes, industrial tourism, industrial heritage tourism and other practical activities.

2.2.3 Exploration on land functional replacement and renewal

Zhang Xiaoyun proposes the development objectives of renovation of Tiexi industrial area. [10] Zhang Pingyu analyzed the institutional factors of Tiexi industrial transformation.[11] Li Dongsheng discussion on Shanghai Yangpu old industrial area updates and adjustment countermeasure. [12]Zhang Xianfeng and Zhang Yunfeng do some research in urban renewal on United Kingdom Birmingham Brindley areas. [13] Liu Jian does some research on Canada Granville Island land resource update practice. [14]

3. Proposal of mining wasteland reuse

3.1. Strengthening legislation and complete legal system

Currently, legislation on wasteland has serious problems, including legislative fragmentation and does not have law on reclaim and reuse wastelands. Provision of wasteland reclamation is too ambiguous and lacking operability. Low ecological restoration requirements standard. Lack unified treatment of wastelands system. Therefore, we should make a comprehensive laws and regulations of mining wasteland reclamation. It should detailed and easy to operate, including the management procedure and

implementing regulations of technical standards. It should has clear information on land reclamation of mining wasteland in sources of funding, the costs management and clearly defined at all levels of authorities and the obligations, responsibilities and duties of relevant enterprises. Establish mining environment supervision system so that to reduce cross management between land resources department and environmental protection department.

3.2. Strengthening wastelands reuse mechanism

Strictly enforce the mining license systems and draw up the repair management standard. Put early measures go with mining development. It should have an ecological planning programmer and specific technology measures in early development. Build planning of wastelands and development technology, do some environment economic analysis. In aspects of policy, it should developed legal and regulations. Carry out the academic research and exchange on the wasteland reuse.

3.3. Strengthening collaboration, raising funds through various channels

There are certain numbers of mining wasteland research institutions in China, but it is disjointed. It is difficult to form a joint force. Less money spent on wasteland reuse, does not establish an effective market mechanism of investment and financing, the lack of stable sources of government funding channels. Many seriously polluted wasteland still in a state of no governance. We should prepare the project funds through various channels, such as the establishment of wasteland bonding system, financial and technical support from international organizations and work with developers to reconstruction and development also.

3.4. Adjust measures to local conditions, raise the level of public participation

Land reclamation and ecological restoration work depends on local conditions. Let the public know about reuse of mining wasteland projects. Their planning and reconstruction will be formed external forces to monitor and regulate treatment of wastelands. [15]

4. Conclusion

Many people but fewer land is the reality of our country. Mining wastelands management works started late. China's sustainable development policy requires us to rely on strong science. At the same time, strengthening the legal system and intensify law enforcement efforts to widen financing channel. These are really implements to reuse mining wastelands.

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